REMARKS

Applicants appreciate the Examiner's thorough examination of the present application as evidenced by the Office Action of April 22, 2002 (hereinafter "Office Action"). Applicants especially appreciate the indication that Claims 5, 10, 18, and 26 recite patentable subject matter. In response, Applicants have amended the Specification to include serial numbers for the referenced applications. Applicants have also amended independent Claims 1, 12, and 20 to include recitations from dependent Claims 4, 15, and 23, respectively. Accordingly, dependent Claims 4, 15, and 23 have been canceled without prejudice or disclaimer. New independent Claims 28 - 30 have been added that correspond to Claims 10, 18, and 26 written in independent form.

Applicants respectfully submit that the cited references, either alone or in combination, fail to disclose or suggest all of the recitations of independent Claims 1, 12, and 20, as amended. Therefore, Applicants respectfully submit that all pending claims are in condition for allowance. Favorable reconsideration of all pending claims is respectfully requested for at least the reasons discussed hereafter.

Independent Claims 1, 12, and 20 are Patentable

Independent Claims 1, 12, and 20 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U. S. Patent No. 6,337, 999 to Orban (hereinafter "Orban") in view of U. S. Patent No. 5,293,401 to Serfaty (hereinafter "Serfaty"). Independent Claims 1, 12, and 20 are directed to demodulating a data signal transmitted from a digital source at a network sampling rate that is synchronized with a network clock. Claim 1, for example, is directed to a receiver that comprises a two-stage interpolator and has been amended to include the following recitations from Claim 4, which further clarify the description of the two-stage interpolator:

> ...the two-stage interpolator comprising:
> a polyphase interpolator, responsive to the digital samples of the data signal, that generates first and second estimates for each of the digital samples of the data signal; and
> a linear interpolator, responsive to the first and second estimates, that generates the interpolated digital samples...(Claims 12 and 20 include similar recitations).

According to the recitations of independent Claim 1, 12, and 20, the two-stage interpolator

comprises both a polyphase interpolator and a linear interpolator. This aspect of the present invention is discussed in the Specification with reference to **FIG. 7** at page 17, line 12 through page 18, line 21.

In rejecting Claim 4, the Office Action cites col. 3, line 64, through col. 4, line 7 of Orban and states "FIR filter is polyphase and linear but this is after interpolation so polyphase and linearity can be considered to be part of interpolation." (Office Action, paragraph 14). Applicants respectfully disagree with this interpretation of Orban's disclosure. Orban describes the filter **400** as a "half-band, polyphase symmetrical finite impulse response (FIR) filter (as is well-known in the art) to minimize the number of operations necessary to realize the filter while retaining phase linearity." (Orban, col. 3, line 67 - col. 4, line 1). Thus, the filter **400** described in Orban is a polyphase FIR filter. The combination of the upsampler **200** and the filter **400** shown in **FIG. 2** of Orban may be considered a polyphase interpolator. None of the upsampler/filter combinations described in Orban, however, may be considered a linear interpolator as recited in independent Claims 1, 12, and 20.

Orban's reference to "phase linearity" at col. 4, line 3, reproduced above, pertains to the general characteristic of a FIR filter being a linear phase filter, *i.e.*, the phase of the signal output from the filter is a linear function of the signal's frequency. Applicants respectfully submit that Orban's reference to phase linearity is in no way related to the concept of linear interpolation. Moreover, Serfaty fails to provide any disclosure with respect to either polyphase interpolation or linear interpolation. Applicants submit, therefore, that neither Orban nor Serfaty contain any disclosure or suggestion of a two-stage interpolator that comprises both a polyphase interpolator and a linear interpolator as recited in independent Claims 1, 12, and 20.

For at least the foregoing reasons, Applicants respectfully submit that independent Claims 1, 12, and 20 are patentable over Orban in view of Serfaty, and that dependent Claims 2, 3, 5 - 11, 13, 14, 16 - 19, 21, 22, 24 - 27 are patentable at least by virtue of their depending from an allowable claim.

Independent Claims 28 - 30 are Patentable

Independent Claims correspond to dependent Claims 10, 18, and 26, which have been indicated as being allowable in the Office Action, written in independent form. Therefore,

Applicants respectfully submit that Claims 28 - 30 are allowable.

Dependent Claim 5 is Separately Patentable

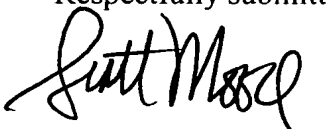
As mentioned above, the Office Action indicates that dependent Claim 5 recites patentable subject matter. Therfore, Applicants respectfully submit that Claim 5 is separately patentable.

CONCLUSION

In light of the above amendments and remarks, Applicants respectfully submit that the above-entitled application is now in condition for allowance. Favorable reconsideration of this application, as amended, is respectfully requested. If, in the opinion of the Examiner, a telephonic conference would expedite the examination of this matter, the Examiner is invited to call the undersigned attorney at (919) 854-1400.

It is not believed that an extension of time and/or additional fee(s), including fees for net addition of claims, are required, beyond those that may otherwise be provided for in documents accompanying this paper. In the event, however, that an extension of time is necessary to allow consideration of this paper, such an extension is hereby petitioned under 37 C.F.R. §1.136(a). Any additional fees believed to be due in connection with this paper may be charged to IBM's Deposit Account No. 09-1990.

Respectfully submitted,



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CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, Washington, DC 20231, on July 31, 2002.

Traci A. Brown
Date of Signature: July 31, 2002

VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Specification:

The paragraph beginning at page 1, line 1, has been amended by adding the language that is underlined ("__") and by deleting the language that is enclosed within brackets ("[ ]"):

This application is related to U.S. Application No. [_____] 09/264,272, entitled *MODEMS, METHODS, AND COMPUTER PROGRAM PRODUCTS FOR IDENTIFYING A SIGNALING ALPHABET IN VARIANCE WITH AN IDEAL ALPHABET DUE TO DIGITAL IMPAIRMENTS* [(Docket No. RA9-98-075)], U.S. Application No. [_____] 09/264,094, entitled *DECISION FEEDBACK EQUALIZERS, METHODS, AND COMPUTER PROGRAM PRODUCTS FOR DETECTING SEVERE ERROR EVENTS AND PRESERVING EQUALIZER FILTER CHARACTERISTICS IN RESPONSE THERETO* [(Docket No. RA9-98-076)], U.S. Application No. [_____] 09/264,475, entitled *MODEMS, METHODS, AND COMPUTER PROGRAM PRODUCTS FOR SELECTING AN OPTIMUM DATA RATE USING ERROR SIGNALS REPRESENTING THE DIFFERENCE BETWEEN THE OUTPUT OF AN EQUALIZER AND THE OUTPUT OF A SLICER OR DETECTOR* [(Docket No. RA9-98-077)], U.S. Application No. [_____] 09/264,422, entitled *MODEMS, METHODS, AND COMPUTER PROGRAM PRODUCTS FOR RECOVERING FROM ERRORS IN A TONE REVERSAL SEQUENCE BETWEEN TWO MODEMS* [(Docket No. RA9-98-078)], and U.S. Application No. [_____] 09/264,421, entitled *MODEMS, METHODS, AND COMPUTER PROGRAM PRODUCTS FOR FALLING BACK TO A LOWER DATA RATE PROTOCOL UPON DETECTING ABNORMAL LINE CONDITIONS DURING STARTUP* [(Docket No. RA9-98-079)], which are filed contemporaneously herewith and the disclosures of which are incorporated herein by reference.

In the Claims:

Please amend the following Claims by adding the language that is underlined ("__") and by deleting the language that is enclosed within brackets ("[ ]"):

1. (Amended) A receiver for demodulating a data signal transmitted from a digital source at a network sampling rate that is synchronized with a network clock, comprising:

a two-stage interpolator, responsive to digital samples of the data signal, that generates interpolated digital samples in response thereto, the digital samples having a first local sample rate that is synchronized with a local clock and the interpolated digital samples having a second local sample rate that is synchronized with the network clock[;], the two-stage interpolator comprising:

a polyphase interpolator, responsive to the digital samples of the data signal, that generates first and second estimates for each of the digital samples of the data signal; and

a linear interpolator, responsive to the first and second estimates, that generates the interpolated digital samples;

an adaptive fractionally spaced decision feedback equalizer, responsive to the interpolated digital samples, that generates equalized digital samples at the network sampling rate in synchronization with the network clock; and

a slicer, responsive to the equalized digital samples, that generates detected symbols therefrom corresponding to data from the data signal.

Please cancel Claim 4 without prejudice or disclaimer.

5. (Amended) A receiver as recited in Claim [4] 1, wherein the two-stage interpolator further comprises:

a time converter, responsive to the sampling index signal, that generates first and second integers in response thereto, the polyphase interpolator being responsive to the first integer and the linear interpolator being responsive to the second integer.

12. (Amended) A method for demodulating, in a receiver, a data signal transmitted from a digital source at a network sampling rate that is synchronized with a network clock, comprising the steps of:

sampling the data signal to produce digital samples at a first local sample rate that is

synchronized with a local clock;

interpolating the digital samples to produce first and second estimates for each of the digital samples using a polyphase interpolator;

interpolating the first and second estimates to produce interpolated digital samples having a second local sample rate that is synchronized with the network clock using a linear interpolator;

equalizing the interpolated digital samples to produce equalized digital samples; and

decoding the equalized digital samples to generate detected symbols therefrom.

Please cancel Claim 15 without prejudice or disclaimer.

20. (Amended) A computer program product for demodulating, in a receiver, a data signal transmitted from a digital source at a network sampling rate that is synchronized with a network clock, comprising:

a computer readable storage medium having computer readable code means embodied therein, the computer readable code means comprising:

logic configured to sample the data signal to produce digital samples at a first local sample rate that is synchronized with a local clock;

first logic configured to interpolate the digital samples to produce first and second estimates for each of the digital samples[;], the first logic configured to interpolate comprising:

logic configured to use a polyphase interpolator to produce the first and second estimates;

second logic configured to interpolate the first and second estimates to produce interpolated digital samples having a second local sample rate that is synchronized with the network clock[;], the second logic configured to interpolate comprising:

logic configured to use a linear interpolator to produce the interpolated digital samples;

logic configured to equalize the interpolated digital samples to produce equalized digital samples; and

logic configured to decode the equalized digital samples to generate detected symbols therefrom.

Please cancel Claim 23 without prejudice or disclaimer.